

WHAT IS CLAIMED IS:

Sub A1 1. A hand held vacuum cleaner for filtering particles of dust and debris from an airflow passing through the vacuum cleaner, comprising;
a coarse pre-filter, and
a fine primary filter which is located rearwardly of the pre-filter in the direction
5 of flow of the airflow.

2. The vacuum cleaner of claim 1, wherein the diameter of the pores of the pre-filter is set at a substantially uniform value.

3. The vacuum cleaner of claim 2, wherein the diameter of the pores of the pre-filter is set at one substantially uniform value within the range approximately 0.75mm to 1.75mm.

4. The vacuum cleaner of claim 3, wherein the diameter of the pores of the pre-filter each comprise a substantially uniform value of approximately 1mm.

5. The vacuum cleaner of claim 1, wherein the primary filter comprises a concertina shaped arrangement of a filter material.

6. The vacuum cleaner of claim 5, wherein the primary filter comprises a frame and the concertina shaped arrangement of a fine filter material and the concertina shape of the filter material is supported in and maintained by the frame.

7. The vacuum cleaner of claim 6, wherein the frame includes two opposing arrays of arms and the concertina shaped arrangement of the filter material is supported between opposing pairs of said arms.

8. The vacuum cleaner of claim 7, wherein the frame of the primary filter comprises a molded plastics material.

9. The vacuum cleaner of claim 1, wherein the pre-filter is formed with a recess within which the primary filter is received.

9. ~~10.~~ The vacuum cleaner of claim 1, wherein the pre-filter is made from a molded plastic material.

10. ~~11.~~ The vacuum cleaner of claim 1, wherein the pre-filter has a peripheral rim via which is fitted to the primary filter and to a housing part of a vacuum cleaner, wherein a peripheral seal element made of a resilient material surrounds said rim.

12. A vacuum cleaner comprising:

a dual filter system adapted to be secured to a housing of said vacuum cleaner, said dual filter system including:

a pre-filter for filtering coarse particles of debris or dirt entrained in air ingested by the vacuum cleaner;

a primary filter for filtering fine particles of debris or dust entrained in air ingested by the vacuum cleaner; and

the primary filter being formed so as to fit restably at least partially within the pre-filter when the dual filter system is assembled to a housing of the vacuum cleaner.

13. The vacuum cleaner of claim 12, wherein the pre-filter of the dual filter system includes a peripheral rim by which it is fitted to the primary filter and to the housing of the vacuum cleaner.

14. The vacuum cleaner of claim 13, further comprising a peripheral seal element made of a resilient material secured to the peripheral rim.

15. The vacuum cleaner of claim 14, wherein the housing and one of the primary filter or pre-filter include cooperating latching structure for mechanically

securing the dual filter system to the housing in a generally airtight fashion.

16. The vacuum cleaner of claim 14, wherein said seal element comprises a first rearwardly extending resilient portion which extends around the periphery of the rim of the pre-filter towards the primary filter and which surrounds the periphery of the primary filter when the dual filter arrangement is fitted to the vacuum cleaner housing.

17. The vacuum cleaner of 16, wherein the first rearwardly extending resilient portion extends rearwardly beyond the primary filter to engage a portion of a first housing part of a vacuum cleaner to form a seal therewith when the dual filter system is fitted to the vacuum cleaner housing.

18. The vacuum cleaner of claim 17, wherein said seal element comprises a second rearwardly extending resilient portion which extends around the periphery of the rim of the pre-filter towards the primary filter to engage a peripheral rim of the primary filter to form a seal therewith when the dual filter system is fitted to the vacuum cleaner housing.

19. The vacuum cleaner of claim 18, in which said seal element comprises a substantially radially outwardly extending resilient portion which extends around the periphery of the rim of the pre-filter to engage a second housing part of a vacuum cleaner to form a seal therewith when the dual filter system is fitted to the vacuum

cleaner housing.

20. The vacuum cleaner of claim 19, wherein a radially inwardly extending wall is provided on the second housing part of the vacuum cleaner and a front facing surface of the radially outwardly extending resilient portion engages a rearwardly facing surface of said wall to form a seal therebetween.

21. The vacuum cleaner of claim 21, wherein in use of the vacuum cleaner the seal between the radially outwardly extending resilient portion and the radially inwardly extending wall is reinforced by a pressure differential generated by an underpressure located in front of the dual filter system.

22. The vacuum cleaner of claim 19, in which said sealing element comprises a substantially radially outwardly extending resilient portion which extends around the periphery of the rim of the pre-filter wherein the periphery of the radially outwardly extending resilient portion is arranged such that it does not engage the second housing part of the vacuum cleaner when the vacuum cleaner is not in use but when the vacuum cleaner is in use a pressure differential generated by an underpressure located in front of the dual filter system urges the periphery of the radially outwardly extending resilient portion into engagement with the second housing part to form a seal therewith.

23. The vacuum cleaner of claim 22, wherein said second housing part comprises the wall of a removable nose cone of the vacuum cleaner through which

dust and debris are sucked into the vacuum cleaner.

24. The vacuum cleaner of claim 15, wherein at least one cam surface is located between co-operating latching parts of the latching structure, such that the movement of at least one of the latching parts over the cam surface during the latching or unlatching movement causes the seal element to be compressed beyond
5 the degree of compression of the seal element when the pre-filter is latched to the housing.

25. The vacuum cleaner of claim 24, wherein the cooperating latching structure comprises at least one keyhole shaped aperture formed in the rim of the pre-filter through which can be releasably latched a co-operating latch element which extends from the housing.

26. The vacuum cleaner of claim 25, wherein the latch element comprises a peg with an enlarged head which can fit within a widened portion of the keyhole shaped aperture, and a stem which can fit within a narrow portion of the keyhole shaped aperture.

Sub A2 27. A hand held vacuum cleaner system comprising:

a housing;

an electric motor disposed within said housing;

a fan driven by said electric motor for generating a suction airflow of dirt

air-entrained

5 and debris entrained air;

a dual filter system including:

a pre-filter for filtering coarse particles of dirt and debris from the dirt and debris entrained air;

10 a primary filter for filtering fine particles of dirt and debris from the entrained air;

15 said pre-filter forming an open ended box shape and said primary filter being adapted to rest nestably within said pre-filter;

said primary filter further comprising a concertina shaped filtering material; and

20 said housing and one of said pre-filter or primary filter including cooperating latching structure for mechanically interengaging to releasably secure said pre-filter and said primary filter to said housing.

12 28. The vacuum cleaner of claim 27, wherein said pre-filter further comprises a resilient seal secured to a peripheral flange of said pre-filter.

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The vacuum cleaner of claim ~~28~~, wherein said resilient seal operates to form a relatively airtight seal between said pre-filter and said housing when said dual filter system is secured to said housing.

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The vacuum cleaner of claim ~~27~~, wherein said primary filter includes a frame having said concertina shaped filtering material integrally formed therewith such that said concertina shaped filtering material is supported by said frame and is not removable from said frame.

31. A concertina filter arrangement for a vacuum cleaner for filtering particles of dust and debris from an airflow passing through the vacuum cleaner, comprising a frame and a concertina shaped arrangement of filter material wherein the concertina shape of the filter material is supported in and maintained by the
5 frame.

32. A concertina filter arrangement according to claim 31, wherein the frame supports the filter material along its opposed zig-zag edges.

33. A concertina filter arrangement according to claim 32, wherein the frame comprises opposing arrays of arms and the filter material is supported between opposing pairs of said arms.

34. A concertina filter arrangement according to claim 33, wherein said opposing arrays of arms are each arranged to form a zig-zag formation.

35. A concertina filter arrangement according to claim 34, wherein additional pieces of fine filter material are located between adjacent arms of the arrays of arms.

36. A concertina filter arrangement according to claim 31, wherein the frame additionally comprises a peripheral rim via which it can be releasably fitted to a housing portion of a vacuum cleaner.

37. A concertina filter arrangement according to claim 31, wherein the frame of the filter comprises a molded plastics material.

38. A filter arrangement for a vacuum cleaner for filtering particles of dust and debris from an airflow passing through the vacuum cleaner in which the filter has a seal element made of a resilient material for sealing against a housing part of a vacuum cleaner wherein the filter can be releasably latched to a housing portion of a vacuum cleaner by a latching arrangement against a biasing force generated by the seal element.

39. A filter arrangement according to claim 38 wherein at least one cam surface is located between co-operating latching parts of the latching arrangement, such that the movement of at least one of the latching parts over the cam surface during the latching or unlatching movement causes the seal element to be compressed beyond the degree of compression of the seal element when the filter is latched to the first housing portion.

40. A dual filter arrangement according to claim 39, wherein at least one keyhole shaped aperture is provided in the filter through which can be releasably latched a co-operating latch element which extends from the housing portion.

41. A filter arrangement according to claim 40, wherein each latch element comprises a peg with an enlarged head which can fit within a widened portion of the aperture and a stem which can fit within a narrow portion of the aperture.

42. A filter arrangement according to claim 41, wherein the cam surface surrounds the aperture and comprises at least one ridge over which the co-operating

latch element must ride when moving into or out of a latched position.

43. A filter arrangement according to ~~any~~ one of claims 38, wherein the housing portion of the vacuum cleaner is a housing portion which surrounds an inlet to a fan of the vacuum cleaner.

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